Pratylenchus from Sudan, with the description of two new species (Nemata : Tylenchida)

Abdelazim Babiker ZEIDAN and Étienne GERAERT

Instituut voor Dierkunde, Rijksuniversiteit Gent, Ledeganckstraat 35, 9000 Gent, Belgium.

SUMMARY

Two new species of *Pratylenchus*, from soil samples collected by the first author from the rhizosphere of fruit trees, field crops and weeds in Sudan, were described and illustrated. *Pratylenchus yassini* n. sp. has long post-vulval uterine branch, anterior vulva position, lateral field with four lines and occasionally a fifth diagonally interrupted one and crenated tail terminus. *P. elamini* n. sp. is a short species with various body postures when relaxed, tapering uniformly or sharply anteriorly, lateral field with four or five incisures, short stylet and long post-vulval uterine branch. One male of *P. mulchandi* was found, described and illustrated for the first time. Of the three species mentioned an SEM study revealed they have a similar head shape and *en face* (already known from tropical *Pratylenchus* species). *P. teres* is recorded for the first time and *P. neglectus* for the second time in Sudan.

RÉSUMÉ

Pratylenchus *du Soudan comprenant la description de deux nouvelles espèces (Nemata : Tylenchida)*

Deux nouvelles espèces de *Pratylenchus* sont décrites et illustrées, provenant d'échantillons de sol et racines prélevés par le premier auteur dans la rhizosphère d'arbres fruitiers et de plantes cultivées et sauvages du Soudan. *Pratylenchus yassini* n. sp. est caractérisé par un long sac post-utérin, la vulve en position antérieure, le champ latéral comportant quatre lignes et occasionnellement une cinquième ligne oblique et non continue, et l'extrémité crénelée de la queue. *P. elamini* n. sp. est une espèce à corps court, présentant des postures variées lors de la fixation, s'amincissant progressivement ou abruptement vers l'avant, le champ latéral comporte quatre ou cinq incisures, le stylet est court et le sac post-utérin long. Il a été trouvé un mâle de *P. mulchandi*, décrit et illustré ici pour la première fois. L'étude au MEB de ces trois espèces a montré que la forme de la tête et la structure de la face sont similaires, ce qui était déjà connu chez les espèces tropicales de *Pratylenchus*. *P. teres* est signalé au Soudan pour la première fois, et *P. neglectus* pour la deuxième.

Six species of *Pratylenchus* were formerly reported from Northern, Central and Eastern Sudan, namely : *P. delattrei* Luc, 1958; *P. hexincisus* Taylor & Jenkins, 1957; *P. neglectus* (Rensch, 1924) Filip'ev & Schuurmans Stekhoven, 1941; *P. sudanensis* Loof & Yassin, 1971; *P. zeae* Graham, 1951 and *Pratylenchus* sp. (El Amin & Siddiqi, 1970; Yassin *et al.*, 1971; Decker *et al.*, 1980).

The present study of *Pratylenchus* material, found in a crop survey made in Sudan during June 1987 and September 1989, was helped by the appearance of two generic reviews (Frederick & Tarjan, 1989; Handoo & Golden, 1989).

The study revealed four species of *Pratylenchus : P. yassini* n. sp.; *P. elamini* n. sp.; *P. mulchandi* Nandakumar & Khera, 1970 and *P. neglectus* (Rensch, 1924) Filip'ev & Schuurmans Stekhoven, 1941.

Three species have been studied by SEM; their end-on views are very similar and comparable to the views published by Corbett and Clark (1983) for other tropical species such as *P. loosi* Loof, 1960; *P. coffeae* (Zimmerman, 1898) Filip'ev & S. Stekhoven, 1941; *P. zeae* and *P. sefaensis* Fortuner, 1974.

Materials and methods

During the present study more than one hundred soil and root samples were collected from Central and Eastern Sudan from the rhizosphere of poorly growing fruit trees, vegetables, field crops, weeds and ornamentals. Material was processed in the laboratory of Zoology, State University of Gent; first the nematodes were extracted and then fixed with hot formaline; they were transferred to anhydrous glycerine by a modified Seinhorst method (De Grisse, 1969); SEM studies were carried out according to the method described by Luc, Coomans and Sarr (1987).

Table 1

Morphometric data of females of *Pratylenchus yassini* n. sp.
(all measurements in µm, except L)

	Pop. Gezira Holotype	*Research Station Paratypes*	*Pop. Hillat Hassan*
n	1	14	8
L (mm)	0.57	0.548 ± 0.035 (0.495-0.605)	0.491 ± 0.37 (0.435-0.540)
a	30	30 ± 2 (28-34)	28 ± 3 (26-30)
b	6.2	5.6 ± 0.5 (5.0-6.5)	5.6 ± 0.5 (5.1-6.5)
b′	3.7	3.6 ± 0.5 (3.2-5.0)	4.2 ± 0.4 (3.7-4.7)
c	15	17 ± 1 (14-19)	15 ± 1 (13-17)
c′	3.1	3.1 ± 0.3 (2.6-3.8)	3.1 ± 0.4 (2.6-3.7)
V %	73	74 ± 1 (71-75)	74 ± 2 (71-76)
m %	48.5	48.5 ± 1 (47-50)	49 ± 1 (48-50)
Head diameter	8.5	8.5 ± 0.1 (0.8-8.5)	9.0 ±0.5 (8.5-9.5)
Head height	2.5	2.5 ± 0.5 (2.0-3.0)	3.0 ± 0.5 (2.5-3.5)
Stylet length	16.5	17.0 ± 0.5 (16.0-18.0)	17.0 ± 0.5 (16.0-18.5)
Stylet knob W	4.0	4.0 ± 0.5 (3.5-4.5)	4.5 ± 0.5 (4.0-5.0)
Stylet cone L	8.5	8.0 ± 0.5 (7.5-9.0)	8.5 ± 0.5 (8.0-9.0)
DGO	3.0	3.0 ± 0.5 (2.5-3.5)	3.0 ± 0.5 (2.5-3.5)
Nerve ring - AE	68	71 ± 5 (62-78)	65 ± 4 (58-71)
Hemizonid - AE	–	77 (n = 1)	75 ± 5 (69-82)
Excr. pore - AE	89	82 ± 11 (61-94)	78 ±6 (71-86)
Phasmid - PE	17	17 ± 1 (16-19)	17 ± 3 (9-20)
Vagina length	7.0	8.0 ± 1 (6.0-9.0)	7.5 ± 1 (6.0-8.5)
PUS	37	36 ± 4 (31-42)	28 ± 5 (20-33)
VBD	18	18 ± 1 (17-20)	17 ± 1 (15-19)
PUS/VBD	2.1	2.0 ± 0.2 (1.8-2.5)	1.6 ± 0.3 (1.5-2.1)
Tail length	37	34 ± 3 (29-37)	33 ± 4 (26-38)
Tail annuli	29	28 ± 2 (23-30)	25 ± 3 (20-29)
Oesophagus L	160	149 ± 18 (109-167)	120 ± 4 (115-128)
BMD	19	18 ± 2 (16-21)	18 ± 1 (16-20)
Egg (L x W)	(34 x 12) (n = 1)	(20-72 x 12-16) (n = 2)	– –

L = Length; W = Width; DGO = Dorsal oesophageal gland orifice; AE = Anterior body end; PE = Posterior body end; PUS = Post vulvar uterine sac; VBD = Vulval body diameter; BMD = Body maximum diameter.

*Pratylenchus yassini** n. sp.
(Figs 1, 2)

MEASUREMENTS

See Table 1

DESCRIPTION (Based on the type collection)

Females : Moderately long nematodes with rather thin bodies, slightly arcuate to open C-shape when relaxed. Cuticle transversely striated with 1.0-1.5 µm wide annuli. Lip region with three annuli; SEM face view shows an undivided front plate amalgamated with the first annulus and followed by two annuli, offset by a fine but deep constriction from the rest of the body. The oval mouth opening is in dorso-ventral direction about 0.5 µm long. Close to the mouth opening are, left and right, the six fine pores of the inner labial sensilla; at slightly more than 1 µm are, left and right, the approximately 1 µm slits of the amphidial apertures (usually obscured by exudations). The amphidial apertures are not oblique and not dorsally displaced. Although the end-on view shows no line pattern, the central area with the six papillae is slightly demarcated forming an obscure oral disc; slightly indicated are also a ventral and dorsal segment (terminology of Corbett and Clark, 1983). Lateral field occupies about one third of corresponding body diameter with four incisures with the outer ones areolated; by LM a fifth diagonally interrupted line could be observed on seven females; of the six

* After Prof. A. M. Yassin, Senior Nematologist, Agricultural Research Corporation, Wadmedani, Sudan.

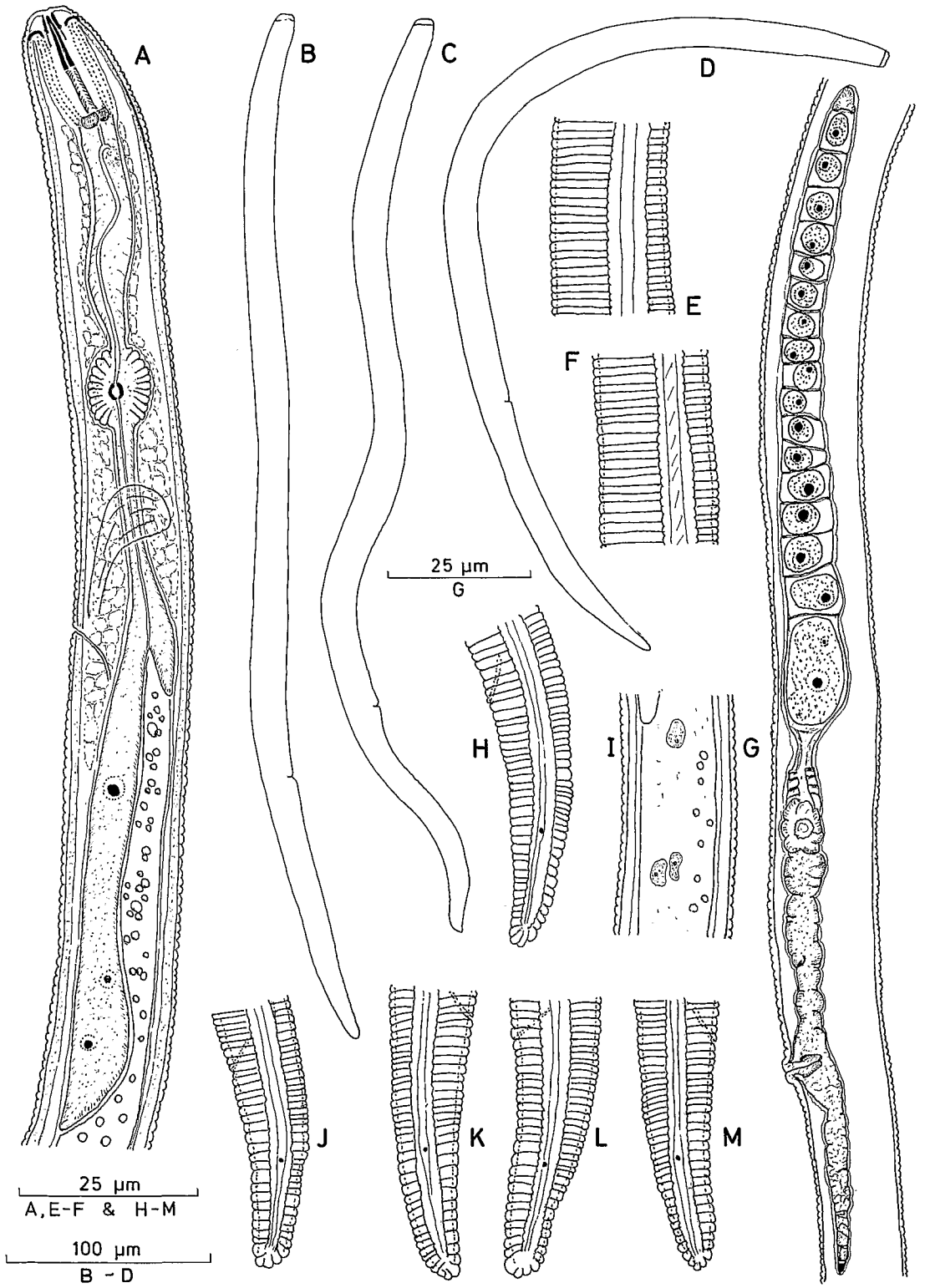

Fig. 1. *Pratylenchus yassini* n. sp. A : Female, anterior region (holotype); B, D : Female, entire; E & F : Lateral field pattern; G : Female, reproductive system; H & J-M : Female, tail regions; I : Intestine with intestinal nuclei.

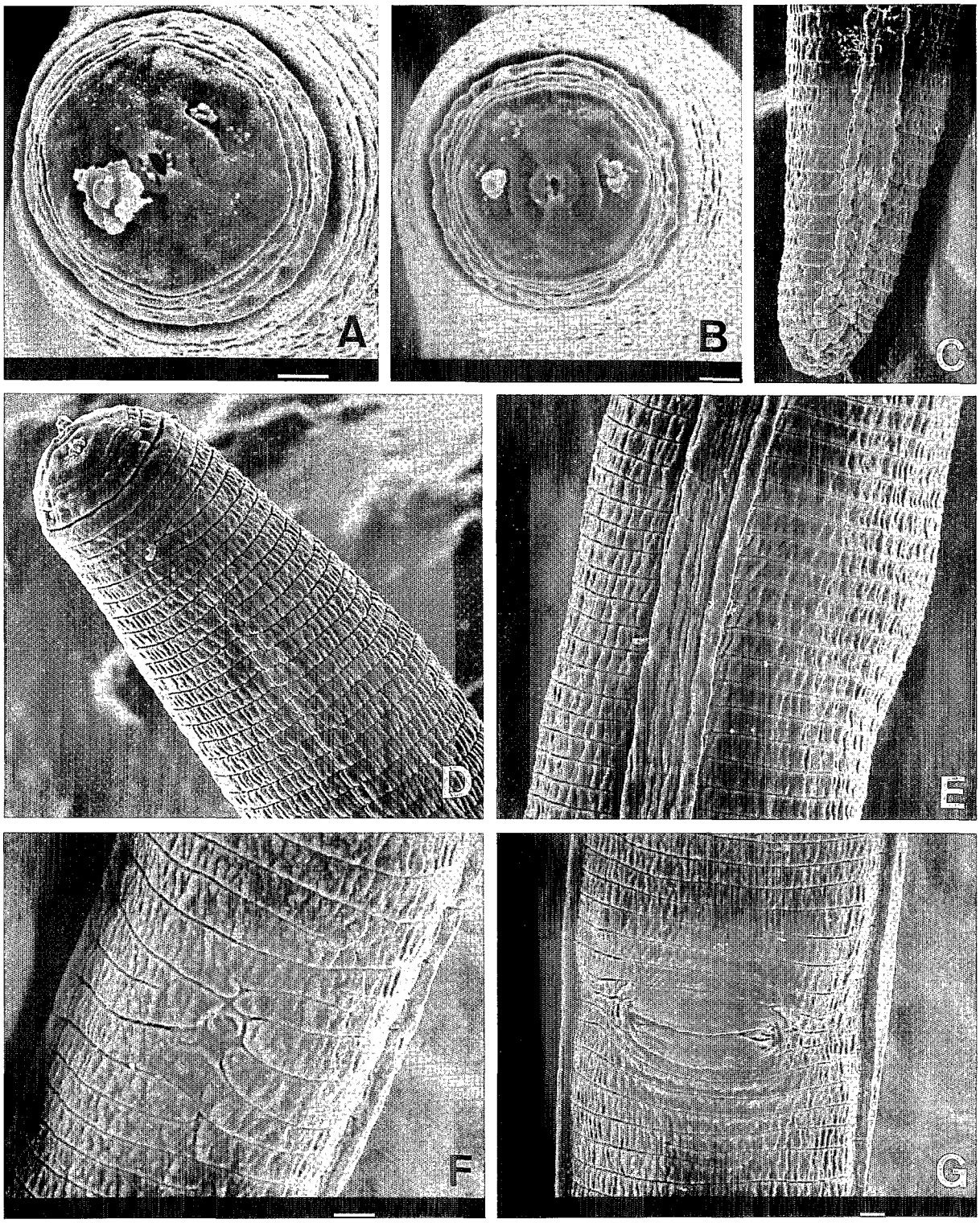

Fig. 2. *Pratylenchus yassini* n. sp. Scanning electron micrographs. — A & B : *En face* views of female; C : Female tail region; D : Female anterior region showing labial annuli and start of lateral field; E : Lateral field; F : Lateral view of anus; G : Lateral view of vulva *(Bar = 1 µm).*

females studied by SEM, all of them showed the diagonally interrupted line, although four of them showed only four lines when viewed under the LM. Stylet knobs rounded and slightly anteriorly indented. Stylet cone is almost as long as or shorter than the shaft. Oesophagus with elliptical median bulb and elongated glandular lobe which overlaps intestine over indistinct oesophago-intestinal junction. The nuclei in the glandular lobe are distinct : one at the level of the transition oesophagus-intestine junction; the two others near to each other in the posterior third of the lobe. Hemizonid observed on only one female. Hemizonion and cephalids were not seen. The intestine has a small central lumen (less than 1 µm), the nuclei are 3.5-5 µm large, granulated, with one nucleolus; not all nuclei are distinct but extrapolation from regions where they are distinct suggests there could be some 30 nuclei. Female genital tract anteriorly outstretched with long post-vulval genital tract consisting of a uterine sac and some cellular material. Oocytes arranged in a single file, spermatheca oval and empty. Vulva slightly raised, transverse slit with thick lips. Tail conical in shape with annulated terminus. Phasmids pore-like.

Males : Not found.

TYPE HABITAT AND LOCALITY

Soil samples collected from the rhizosphere of *Philipisara* sp. (weed plant) in the field of the Gezira Research Station, Plot No. 107, north Wadmedani City (on the western bank of the Blue Nile river; latitude 14° 30′ N and longitude 33° 30′ E), Central Sudan on 6-9-1989.

TYPE MATERIAL

Holotype female and six paratype females on Slide No. 3326 deposited within the collection of the State University of Gent, Instituut voor Dierkunde, Ledeganckstraat 35, 9000 Gent, Belgium; six paratype females sent to USDA, Nematology collection, Beltsville, MD, USA; four paratype females sent to the Nematology collection, Agricultural University, Wageningen, The Netherlands.

OTHER COLLECTION

Eight females (with shorter post-vulval uterine branch, see Table 1) were found in soil samples collected from the rhizosphere of *Psidium guajava, Citrus sinensis, Musa* sp. and *Citrus paradisi* in a fruit orchard on the western bank of the Blue Nile river about two kilometers north of Hillat Hassan (a town about five kilometers south of Wadmedani city), Central Sudan, June 1987. Two females kept within the collection of the University of Gent (Slides Nos. 3327 and 3328), three sent to USA, two sent to the Netherlands and one within the collection of the first author.

DIAGNOSIS AND RELATIONSHIPS

Pratylenchus yassini n. sp. is characterized by the presence of three annuli on the lip region, a vulva of 71-75 %, lateral field composed of four lines and occasionally a fifth diagonally interrupted one, long post-vulval uterine branch (1.5-2.5 times the corresponding vulval body diameter), a conoid tail with 23-30 annuli and crenated terminus; without males and empty spermatheca.

There are only two species with three labial annuli, crenated tail tip, no males and empty spermatheca, i.e. *i) P. crenatus* Loof, 1960 with very posterior vulva position (80-86 %), lateral field with four lines and a post-vulval uterine sac of little more than one time vulval body diameter; *ii) P. teres* Khan & Singh, 1975 with a similar anterior vulva position (69-78 %) as in our species but the lateral field is much wider and has six incisures, the post-vulval uterine sac is about one body width in length; the oocytes are in multiple rows near the ovary top and the tail is relatively shorter (c' = 1.5-2.5 *vs.* c' = 2.6-3.8 in *P. yassini* n. sp.).

Our new species was also compared to species with the same number of labial annuli, similar stylet length and similar anterior vulva position : (*P. pratensis* group of Frederick and Tarjan, 1989), *P. dasi* Fortuner, 1985, *P. delattrei, P. sudanensis* and *P. zeae* Graham, 1951. All these species have a smooth tail tip and shorter post-vulvar uterine sac; most of them were found associated with males.

A dome-shaped head, set off from the body, bearing three annuli and with a plain undivided face was observed in SEM views by Corbett and Clark (1983) in *P. crenatus, P. zeae* and *P. sefaensis;* the last species differ from our species by various measurements (a.o. V = 76-80 %; stylet = 13-16 µm).

Pratylenchus elamini* **n. sp.**

(Figs 3, 4)

MEASUREMENTS

See Table 2

DESCRIPTION (Based on specimens from the type population)

* After Prof. Eltigani Mohammed Elamin, Senior Nematologist, Agricultural Research Corporation, Wadmedani, Sudan.

Table 2

Morphometric data of females of *Pratylenchus elamini* n. sp.
(all measurements in µm, except L)

	Pop. Hantoub		*Pop. Kassala*
	Holotype	*Paratypes*	
n	1	13	3
L (mm)	0.385	0.407 ± 0.042 (0.335-0.505)	0.442 (0.390-0.480)
a	28	28 ± 2 (24-32)	27 (24-30)
b	4.8	5.8 ± 0.6 (4.7-6.8)	5.7 (5.4-6.0)
b′	3.4	3.8 ± 0.4 (3.3-4.5)	4.1 (3.9-4.2)
c	17	18 ± 1 (16-20)	19 (17-21)
c′	2.6	2.6 ± 0.4 (2.0-3.7)	2.9 (2.4-3.4)
V %	75	75 ± 1 (72-77)	75-76
m %	50	49 ± 1 (48-50)	49 (48-50)
Head diameter	8.0	8.0 ± 0.5 (7.5-8.5)	8.0 (7.5-8.5)
Head height	2.5	3.0 ± 0.5 (2.5-3.5)	3.0 (2.5-3.5)
Stylet Length	13.5	14.0 ± 0.5 (13.0-14.5)	13.5-14.0
Stylet knob W	3.0	3.5 ± 0.5 (3.0-4.0)	3.5-4.0
Stylet cone L	7.0	6.5-7.0	6.5-7.0
DGO	2.5	2.5 ± 0.5 (2.0-3.0)	2.5-3.0
Nerve ring - AE	61	61 ± 3 (57-66)	58 (51-63)
Hemizonid - AE	69	61 ± 6 (50-70)	68 (58-75)
Excr. pore - AE	73	70 ± 2 (67-73)	72 (62-78)
Phasmid - PE	11	12 ± 2 (9-14)	12-13
Vagina length	6.0	6.0 ± 0.5 (5.0-7.0)	6.0 (5.0-7.0)
PUS	35.5	25.0 ± 4.0 (19.0-31.5)	28 (20-34)
VBD	12.5	14.0 ± 1.5 (12.5-17.0)	16 (14-19)
PUS/VBD	2.9	1.8 ± 0.3 (1.5-2.9)	2.1 (1.8-2.3)
Tail length	23	24 ± 3 (18-27)	24 (19-27)
Tail annuli	21	19 ± 2 (16-22)	20 (18-22)
Oesophagus L	115	108 ± 13 (85-129)	108 (99-115)
BMD	14	15 ± 1 (13-17)	16 (15-18)

L = Length; W = Width; DGO = Dorsal oesophageal gland orifice; AE = Anterior body end; PE = Posterior body end; PUS = Post vulval uterine sac; VBD = Vulval body diameter; BMD = Body maximum diameter.

Females : Short nematodes with slender bodies, showing various body postures upon relaxation varying from rather straight (three females), sharply curved anteriorly (two), showing C (nine) and almost U-shape (one) or spiral forms (two). Cuticle transversely striated with less than 1 µm wide annuli. The lateral field starts about four annuli posterior to lip region with two lines which increase to reach four in ten females and five in seven specimens; outer incisures areolated; on the tail the lateral lines decrease to three or four. Lip region with three annuli and heavily sclerotized framework with the outer margins extending posteriorly between the first and second body annuli. SEM studies shows a dome-shaped head, distinctly offset from rest of body with three annuli (sometimes partly subdivided) and an undivided front with the six labial sensilla appearing as pits close to the mouth opening and two slit-like amphidial apertures in dorso-ventral direction. Stylet well developed, with the conical part almost equal to or slightly shorter than shaft; basal knobs with rounded and anteriorly slightly indented margins. Oesophagus with elliptical median bulb and rather long glandular lobe that overlaps intestine over poorly developed oesophago-intestinal junction. Hemizonid about two annuli wide and situated one or two annuli anterior to excretory pore. Female genital tract anteriorly outstretched with long post-vulval uterine branch. Oocytes are arranged in a single file and spermatheca oval and devoid of sperms. Vulva a transverse slit, slightly raised from body contour in most females. Tail conical in shape with an almost conical smooth terminus. Phasmids pore-like.

Males : Not found.

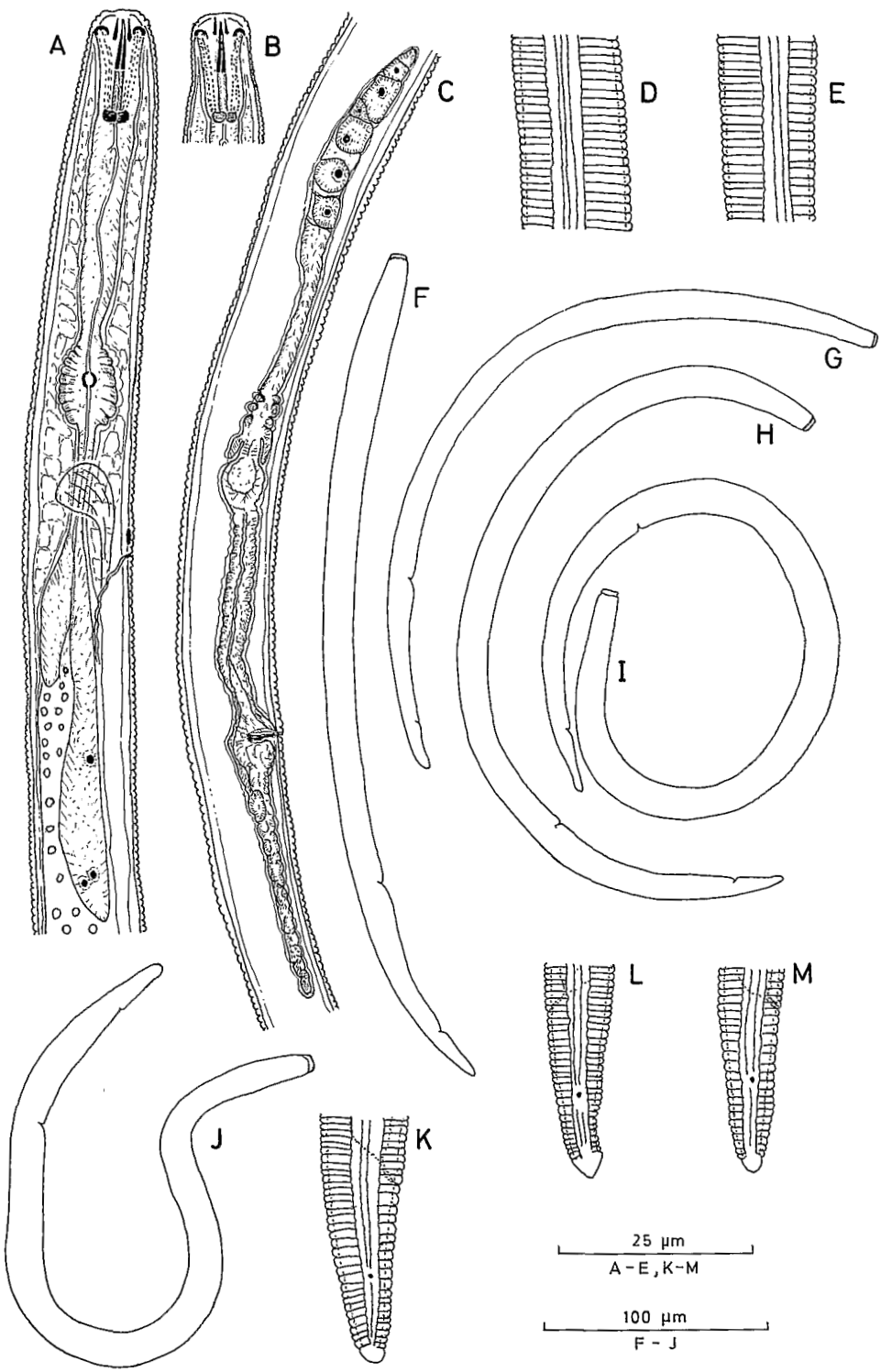

Fig. 3. *Pratylenchus elamini* n. sp. A : Female, anterior region (holotype); B : Female with sharply tapering anterior region; C : Female reproductive system; D, E : Lateral field pattern; F-J : Female entire bodies showing variation of shapes upon relaxation; K-M : Female, tail regions.

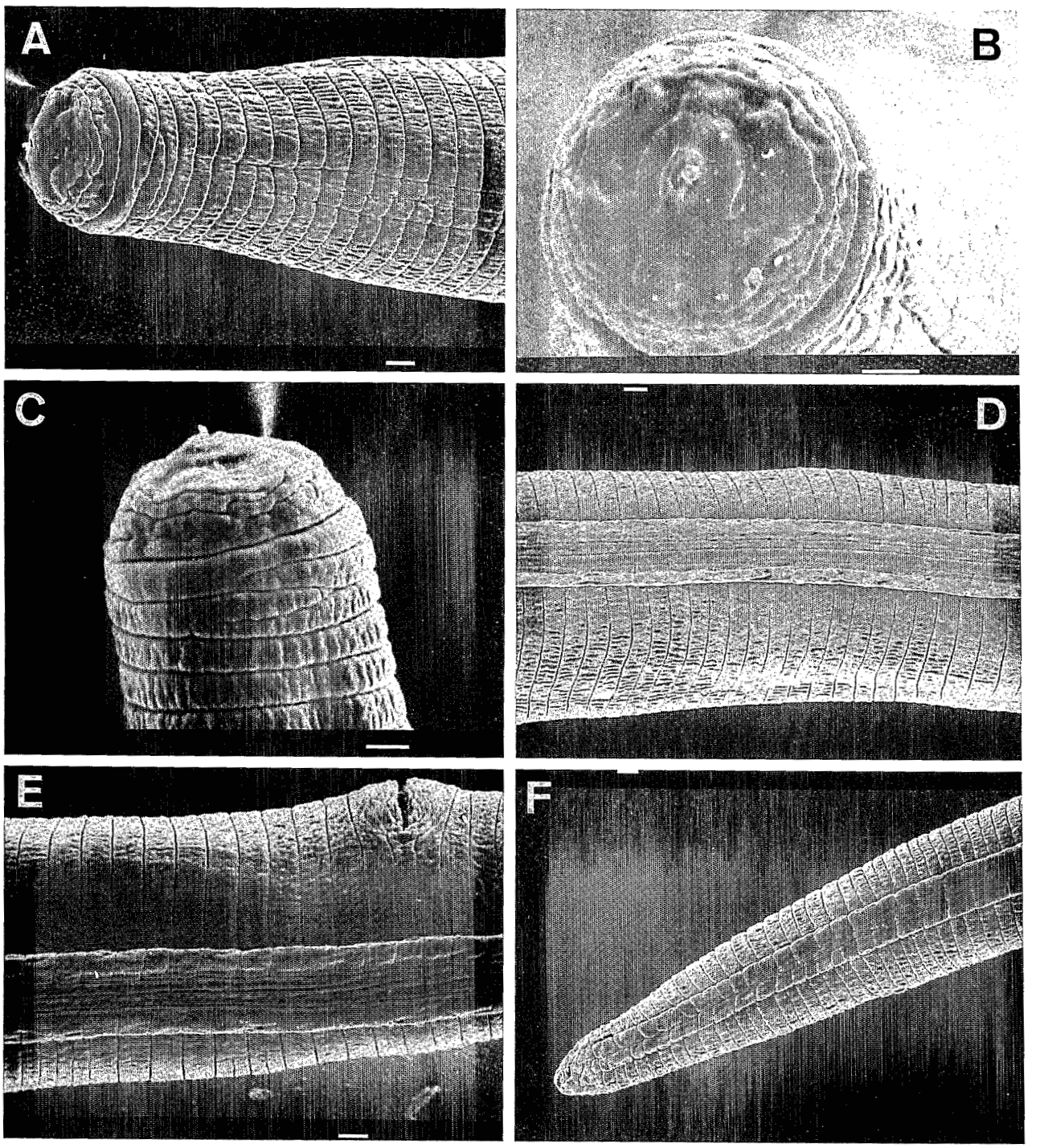

Fig. 4. *Pratylenchus elamini* n. sp. Scanning electron micrographs. A : Lateral view of female showing tapering anterior region; B : *En face* view of female; C : Female lip region showing labial annuli; D : Lateral field; D : Lateral view of vulva; E : Female, tail region *(Bar = 1 µm).*

TYPE HABITAT AND LOCALITY

Soil samples collected from the rhizosphere of *Citrus paradisi* in a fruit orchard about one kilometer north of Hantoub town (on the eastern bank of the Blue Nile river situated just across the river to Wadmedani City), Central Sudan, June 1987.

TYPE MATERIAL

Holotype female and three paratype females mounted on Slides Nos. 3329, 3330, and 3331, deposited within the collection of the State University of Gent, Instituut voor Dierkunde, Ledeganckstraat 35, 9000 Gent, Belgium; two females sent to USDA Nematology collection, Beltsville, MD, USA; two females sent to Nematology collection, Agricultural University, Wageningen, The Netherlands and three females in the collection of the first author.

OTHER MATERIAL, HABITAT AND LOCALITY

Three females; two kept within the collection of the University of Gent, mounted on Slide No. 3332 and the third one kept within the collection of the first author, collected from the rhizosphere of *Psidium guajava* from a fruit orchard about two kilometers north of Kassala City (latitude 15° 30′ N and longitude 36° 30′ E), Eastern Sudan during June 1987.

DIAGNOSIS AND RELATIONSHIPS

Pratylenchus elamini n. sp. is characterized by short body, 0.335-0.505 mm long, with wide variation of body shape upon relaxation, variable anterior body shape, three labial annuli, short stylet (13.0-14.5 µm), anterior vulva position (72-77 %), a long post-vulval uterine sac (1.5-2.9 times corresponding vulval body diameter), smooth conical tail terminus, without males and with empty spermatheca.

The new species is comparable by the small body length, the three labial annuli, the short stylet, the anterior vulva and the smooth tail terminus to : *P. kralli* Ryss, 1982; *P. sudanensis* and *P. uralensis* Romaniko, 1977 (considered *species inquirenda* by Frederick and Tarjan, 1989). *P. sudanensis* (with males) and *P. uralensis* (without males) have a subcylindroid tail with a truncate terminus and a short post-vulval uterine branch. The main difference between our populations and *P. kralli* is that *P. kralli* is a bisexual species whereas *P. elamini* sp. n. is a parthenogenetic one. This difference is commonly used in *Pratylenchus* although we do not know if it has to have such a significance; Frederick and Tarjan (1989) gave the character less importance and synonymized *P. sefaensis* Fortuner, 1974 (without males) with *P. pseudopratensis* Seinhorst, 1968 (with males) although they continued considering them as two different species in their article (see p. 250); we suggest to use both names.

Frederick and Tarjan (1989) synonymized *P. ventroprojectus* Bernard, 1984 with *P. kralli*. The tail terminus in *P. ventroprojectus* is described as " truncate with a distinct subventral projection "; in *P. kralli* the tail terminus is drawn and described in a similar way. In *P. elamini* sp. n. the tail tip is almost conical without any ventral projection. Moreover the post-vulval uterine branch can be longer in *P. elamini* (1.5-2.9 times vulval body diameter) than in *P. kralli* (more than 1.5) and in *P. ventroprojectus* (0.9-1.8).

The following species are also morphologically similar, but differ in some measurement(s) : *P. delattrei* (stylet = 16-18 µm); *P. emarginatus* Eroshenko, 1978 (V = 68-73 %); *P. microstylus* Bajaj & Bhatti, 1984 (stylet = 11-12 µm); *P. sefaensis* (V = 77-80 %); *P. thornei* Sher & Allen, 1953 (stylet = 15-19 µm) and *P. zeae* (stylet = 15-17 µm).

The SEM view of the head of *P. elamini* n. sp. is not different from that of *P. yassini* n. sp. and so resembles the species mentioned there.

Pratylenchus mulchandi Nandakumar & Khera, 1970

(Figs 5, 6)

MEASUREMENTS

See Table 3

DESCRIPTION (Based on specimens from New Halfa population)

Females : Moderately long nematodes with rather thin bodies showing slightly ventrally arcuate bodies when relaxed. Cuticle transversely striated with fine, less than 1 µm wide annuli. Lateral field with four lines; some specimens showed two lines by LM, SEM showed the disapperance of two or more incisures at level of vulva. Lip region with three annuli and heavily sclerotized framework. SEM shows a dome-shaped head with three annuli, set off from body; the front is undivided; the oral disc does not show the six pits of the labial sensilla; amphidial apertures dorso-ventral slits as usual. Stylet very strong, with conical part as long as or shorter than the shaft and provided with rounded and slightly anteriorly curved basal knobs. Oesophagus with elliptical to oval median bulb and moderately long glandular lobe which overlaps intestine ventrally over indistinct oesophago-intestinal junction. Hemizonid about two annuli wide and situated at about one annulus anterior to the excretory pore. Female genital tract anteriorly outstretched in most females, reflexed in a single female. Post-vulval uterine sac long. Oocytes arranged in one or two files; one egg was observed in one female measuring 31 × 23 µm. Spermatheca oval in shape and empty.

Table 3

Morphometric data of *Pratylenchus mulchandi* Nandakumar & Khera, 1970
(all measurements in µm, except L)

	Pop. New Halfa		*Pop. Guneid*
	Females	*Male*	*Females*
n	17	1	8
L (mm)	0.540 ± 0.041 (0.465-0.595)	0.528	0.529 ± 0.033 (0.485-0.575)
a	30 ± 2 (26-32)	33	29 ± 2 (28-32)
b	6.0 ± 0.5 (5.0-6.8)	7.1	6.4 ± 0.3 (5.9-6.6)
b′	4.1 ± 0.3 (3.5-4.7)	4.3	3.9 ± 0.4 (3.4-4.6)
c	16 ± 1 (15-19)	20	16 ± 2 (13-18)
c′	2.9 ± 0.3 (2.1-3.2)	2.4	3.0 ± 0.4 (2.5-3.9)
V %	75 ± 2 (72 ± 77)	–	73 ± 1 (71-75)
T %	–	34	–
m %	47.5 ± 1.5 (44-50)	48	47 ± 2 (44-50)
Head diameter	8.5 ± 0.5 (8.0-9.0)	8.0	9.0 ± 0.5 (8.5-9.5)
Head height	3.5 ± 0.5 (3.0-4.0)	3.5	3.5 ± 0.5 (3.0-4.0)
Stylet length	17.5 ± 0.5 (16.5-18.5)	15.5	17.5 ± 0.5 (16.5-18.5)
Stylet knob W	4.0 ± 0.5 (3.5-4.5)	3.5	4.0 ± 0.5 (3.5-4.5)
Stylet cone L	8.5 ± 0.5 (7.5-9.0)	7.5	8.5 ± 0.5 (8.0-9.0)
DGO	3.5 ± 1.0 (2.5-5.0)	3.5	3.5 ± 0.5 (3.0-4.0)
Nerve ring - AE	71 ± 3 (66-76)	63	66 ± 2 (64-71)
Hemizonid - AE	81 ± 4 (76-92)	74	74 ± 8 (66-85)
Excr. pore - AE	85 ± 4 (81-95)	78	78 ± 7 (70-87)
Phasmid - PE	19 ± 3 (15-22)	15	17 ± 3 (13-20)
Vagina length	6.5 ± 1.0 (5.5-8.5)		7.0 ± 1.0 (6.0-9.0)
Spicule length	–	14.0	–
Gubernaculum L	–	4.5	–
PUS	40 ± 3 (35-45)	–	30 ± 10 (19-45)
VBD	17 ± 2 (14-21)	–	17.5 ± 2.0 (15.5-20.0)
PUS/VBD	2.4 ± 0.4 (1.9-3.2)	–	1.8 ± 0.7 (1.1-3.2)
Tail length	33 ± 3 (28-38)	26	34 ± 5 (27-41)
Tail annuli	25 ± 2 (22-29)	–	25 ± 3 (20-28)
Oesophagus L	133 ± 10 (116-155)	122	134 ± 8 (126-146)
BMD	18 ± 2 (15-20)	16	18 ± 2 (16-20)
Egg (L x W)	31 x 23 (n = 1)	–	– –

L = Length; W = Width; DGO = Dorsal oesophageal gland orifice; AE = Anterior body end; PE = Posterior body end; PUS = Post vulval uterine sac; VBD = Vulval body diameter; BMD = Body maximum diameter.

Vulva a transverse slit. Vagina uterina with a highly refractive triangular peg of variable size and shape (artifact?). Tail with smooth conical to rounded terminus.

Male : Anterior body end similar to female. Lateral field, as in some females, only two lines distinct over most of the body, two inner lines could be detected just anterior to phasmid. Testes anteriorly outstretched. Bursa enveloping whole tail.

Material, habitat and locality

New Halfa population : Seventeen females and one male from Samples Nos. PS/4 and PS/11 collected from the rhizosphere of *Saccharum officinarum* in the field of New Halfa sugar factory, New Halfa city (latitude 16° 15′ N and longitude 35° 30′ E), Eastern Sudan, during June 1987.

Guneid population : Eight females from Sample No. PS/10 collected from the rhizosphere of *Saccharum officinarum* in the field of Guneid sugar factory, Guneid town (latitude 15° 15′ N and longitude 33° 00′ E), Central Sudan, during June 1987.

Comparison with type population

Type population of *Pratylenchus mulchandi* was first described by Nandakumar and Khera (1969) from soil around the roots of *Pennisetum typhoides* and *Sorghum vulgare* in Lamba, Merta city north-west Jodhpur (Rajas-

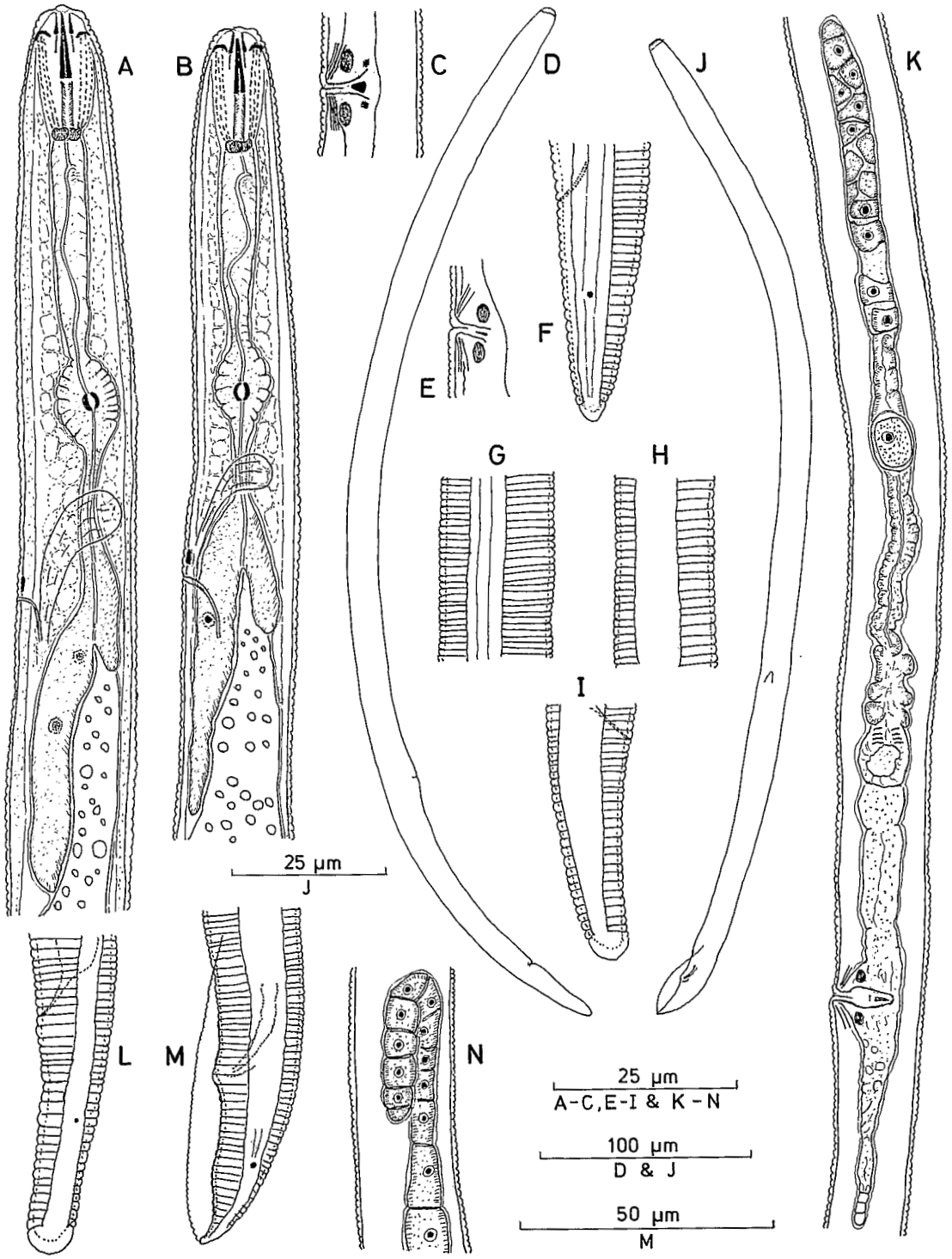

Fig. 5. *Pratylenchus mulchandi.* A : Female, anterior region; B : Male, anterior region; C, E : Lateral view of vagina showing refractive pegs of different size; D : Female, entire; F, I, L : Female, tail region; G, H : Lateral field pattern; J : Male, entire; K : Female, reproductive system; M : Male, tail; N : Reflexed ovary.

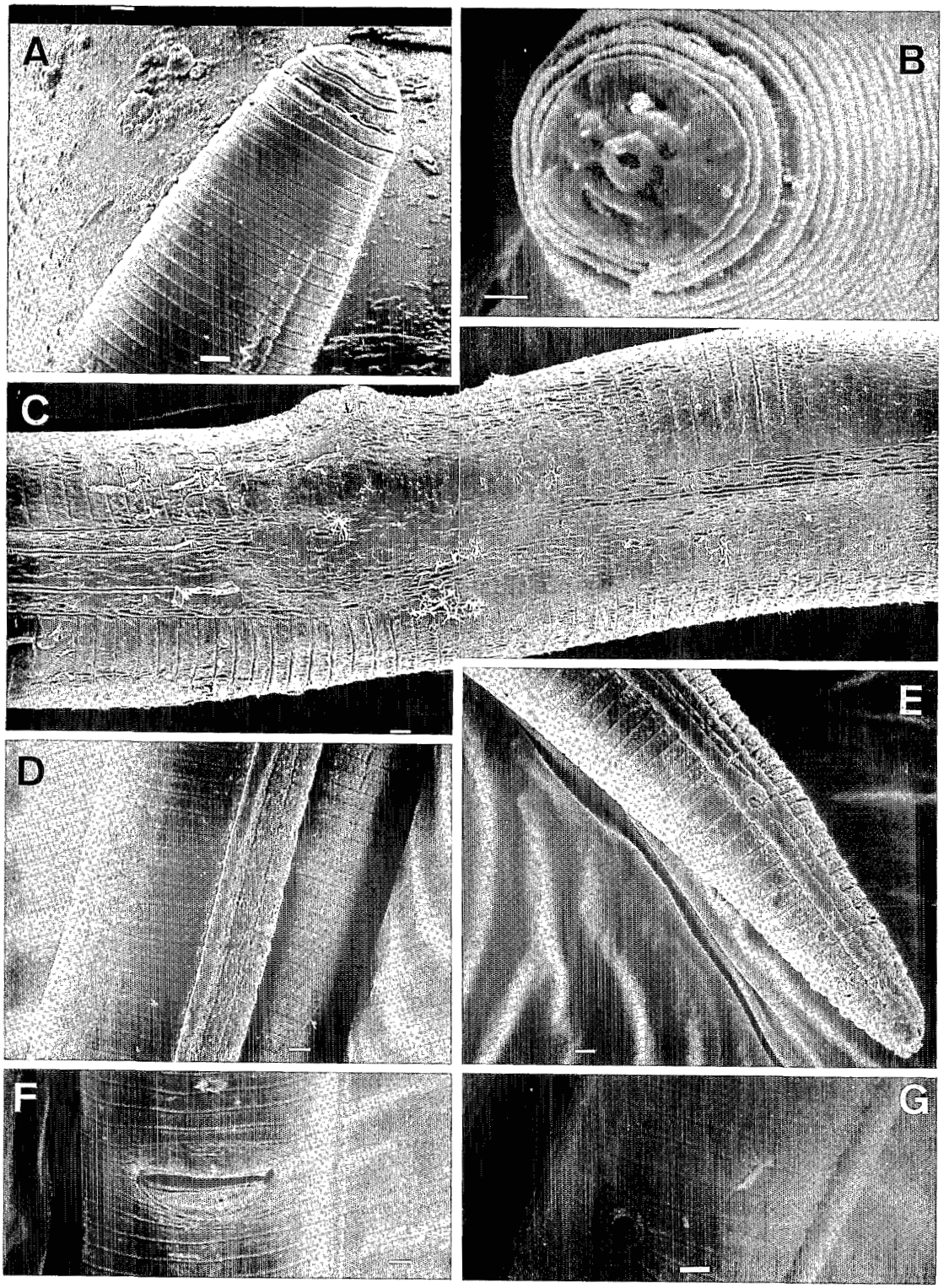

Fig. 6. *Pratylenchus mulchandi.* Scanning electron micrographs. A : Lateral view of female anterior region; B : *En face* view of female; C : Lateral view of female mid-body showing disappearance of two lines, at and posterior to vulva; D : Lateral field; E : Female tail showing anus and phasmid; F : Ventral view of vulva; G : Ventral view of anus *(Bar = 1 µm).*

than) who reported 55 females and not a single male in their description.

Our two populations agree with most of the original description, however, some differences were noticed : *i)* the more anterior vulva position (72-77 %) in our population compared to (75-78 %) of type populations; *ii)* the lateral field pattern in our population as some of our specimens showed only two lines; *iii)* the existence of highly refractive pegs inside the vagina uterina, not referred to in the original description.

Due to the courtesy of Dr. Golden (USDA) we received a paratype slide of *P. mulchandi.* The specimens were, however, badly preserved and did not yield much information.

Nevertheless we consider our populations to belong to *P. mulchandi* and consider our description of the single male as the first record of males for this species.

This is the first record for *P. mulchandi* for Sudan.

Pratylenchus neglectus (Rensch, 1924) Filip'ev & Schuurmans Stekhoven, 1941

(Fig. 7)

MEASUREMENTS

Females : (n = 2), L = 0.45-0.46 mm, a = 19-24, b = 3.6-3.8, c = 17-18, c' = 2.4-2.5, V = 83-85 %; Stylet = 16.5-17.5 µm.

Males : Not found.

DESCRIPTION

Females : Short, rather thick, 19-25 µm wide nematodes. Bodies slightly ventrally arcuate to sharply ventrally curved anterior to vulva when relaxed. Cuticle transversely striated with 1.0-1.5 µm wide annuli. Lateral field with four lines; the median zone comprises diagonally interrupted lines in one female and a continuous one in the other. Lip region low, slightly anteriorly convex, 9.0-9.5 µm in diameter and 3.5 µm high, with two annuli nearly of equal size; margins of first annulus slightly anteriorly tilted. Labial framework well developed with basal disc extending about two annuli into body. Stylet very strong, with 4.5 µm wide rounded to slightly anteriorly tilted. Labial framework well developed with basal disc extending about two annuli into body. Stylet very strong, with 4.5 µm wide rounded to slightly anteriorly indented basal knobs. Dorsal oesophageal gland opens at 2.0-2.5 µm behind stylet knobs. Oesophagus well developed with rounded to oval median bulb with distinct valvular apparatus; situated anterior to center in one female. Oesophageal glands overlap intestine through poorly developed oesophagointestinal junction. Nerve ring and excretory pore at 63-69 µm and 84 µm from anterior body end, respectively. Hemizonid, of about two annuli wide, situated just anterior to excretory pore. Female reproductive system anteriorly outstretched with oocytes arranged in a single row and a small, rounded, empty spermatheca. Vagina 7.5-8.5 µm long and vulva a transverse slit. Post-vulval uterine sac short, 11-12 µm long i.e. less than one vulval body diameter. Tail conical, 26-27 µm long with rounded or slightly conical non-annulated terminus. Phasmid pore-like, about half way on tail.

Males : Not found.

MATERIAL, HABITAT AND LOCALITY

Two females from Sample No. SS/41 collected from the rhizosphere of *Citrus paradisi* in a fruit orchard one kilometer north of Hantoub town, Central Sudan, during June 1987.

COMPARISON WITH TYPE POPULATION

Type population of *Pratylenchus neglectus* was first described from roots of rye, former estate of Theessen near Maagdeburg, Germany as *Aphelenchus neglectus.* Later on it was described from almost throughout the world infecting wide host range of plants (see Townshend & Anderson, 1976).

Our two females agree very much with the described populations, however, some slight differences are observed, namely : *i)* the outer margins of the first head annulus slightly anteriorly tilted in our two females while they are fairly rounded for described specimens (Townshend & Anderson, 1976 : Fig. 1 B, C); *ii)* the stylet knobs of type specimens are reported as " typically indented on anterior surfaces " (Townshend & Anderson, 1976) while those of our population are rounded or slightly anteriorly indented.

This is the second record for *P. neglectus* from Sudan since reported by Decker, Yassin and Elamin (1980).

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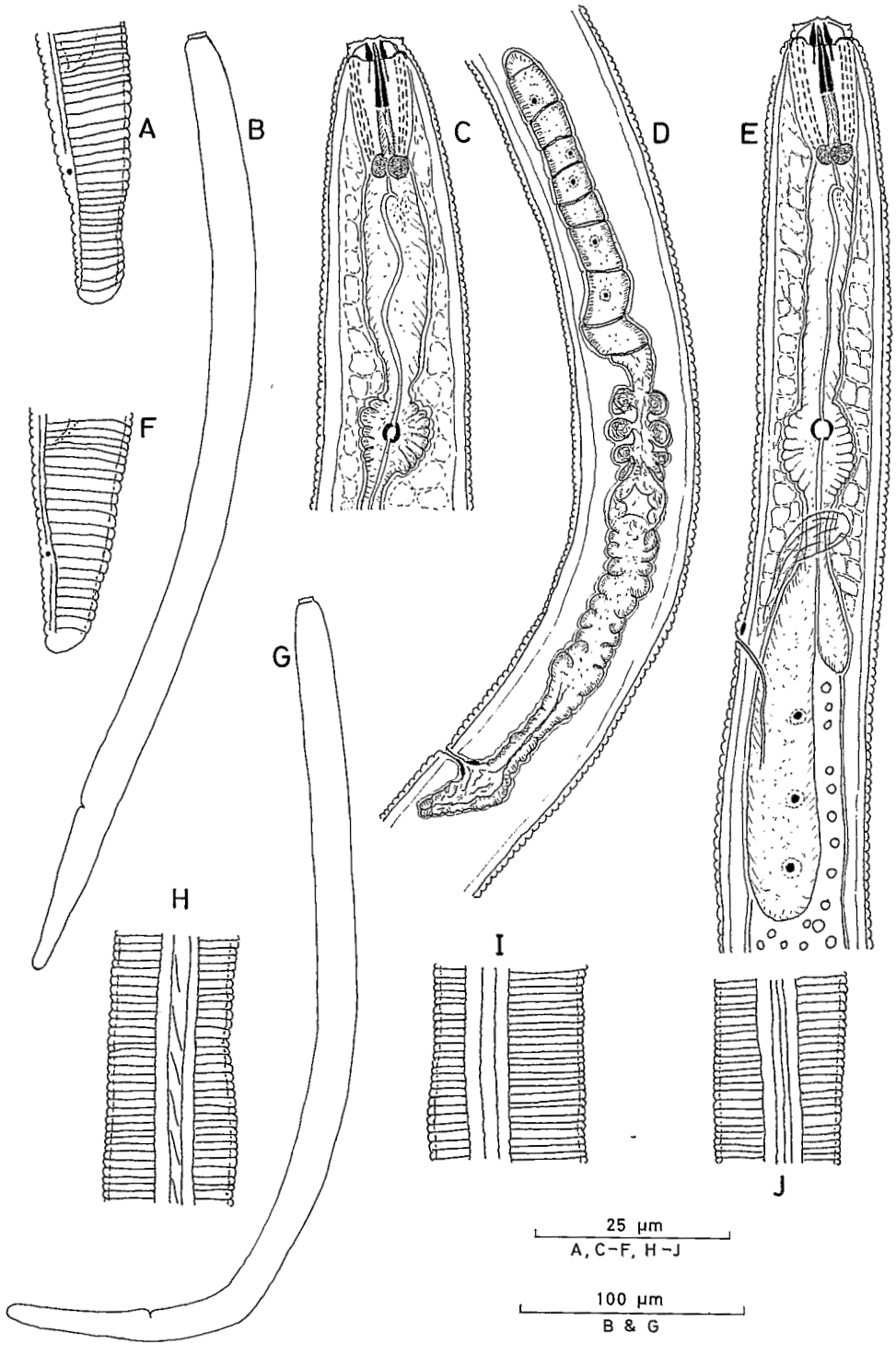

Fig. 7. *Pratylenchus neglectus.* A, F : Female tails; B, G : Female, entire; C, E : Female anterior region showing different positions of valve-apparatus; D : Female reproductive system; H, I & J : Lateral field pattern.

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